Introduction to Neuroscience: Behavioral Neuroscience

Nachum Ulanovsky, Tali Kimchi, Rony Paz

Weizmann Institute of Science

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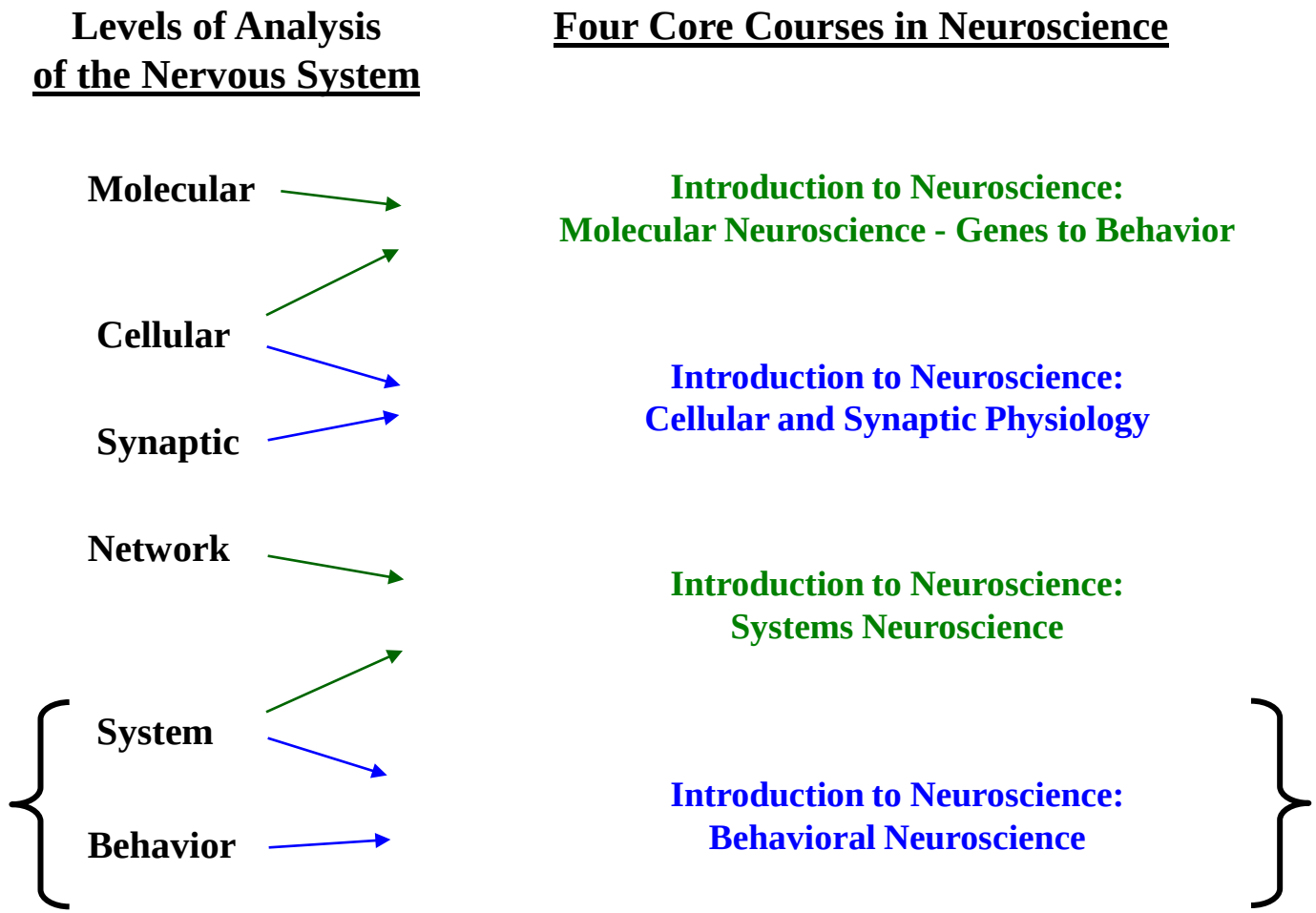
Core courses at the Weizmann Institute in Brain Sciences: Systems, Computational and Behavioral Neuroscience



Course coordinator: **Nachum Ulanovsky**

Department of Neurobiology, Arison bldg. Room 319 (near the Secretariat)

Tel. x 6301

Email: nachum.ulanovsky@weizmann.ac.il

Course Website *(will include ALL the presentations)*:

www.weizmann.ac.il/neurobiology/labs/ulanovsky/courses

Course syllabus (by week)

Part A: Introduction to Brain and Behavior (Kimchi)	
1.	Introduction to Behavior. (15/3/2018)
2.	Hormones, genes and behavior: Mechanisms underlying social and reproductive behaviors. (22/3/2018)
3.	Neurobiology of social behaviors. (29/3/2018)

Course syllabus (by week)

Part B: Neural mechanisms of Behavior – the Neuroethological approach (Ulanovsky)	
4.	Sensory ecology: evolutionary adaptations of animal sensory systems to their environment. (26/4/2018)
5.	Example system #1: Echolocation in bats: Sensory ecology, echolocation behavior, principles of biosonar signal design, neural processing. (10/5/2018)
6.	Example system #2: Multisensory integration in the brain of the barn owl. *(Guest lecture by Prof. Yoram Gutfreund, Technion)* (17/5/2018)
7.	Example system #3: The bird song system: behavior, neuroanatomy, physiology, models. *(Guest lecture by Dr. Liora Las, Weizmann Institute)* (24/5/2018)
8.	Example system #4: Neurobiology of spatial cognition. Introduction to spatial memory and navigation: (i) Navigational strategies in different animals. (ii) Sensory mechanisms of navigation: vision, magnetic navigation, etc. The navigation circuits in the mammalian brain: Place cells, grid cells, head-direction cells. (29/5/2018) *[NOTE: special date. Tuesday 9:15-12:00. Location: Ebner auditorium]*
9.	Summary of the neuroethological approach. Choosing the right behavior and the right animal model. Natural Neuroscience. Comparative Neuroscience. (31/5/2018)

Course syllabus (by week)

Part C: Neural mechanisms of Behavior – the Neuropsychological approach (Paz)	
10.	Introduction: Basic concepts, standard behavioral tasks. Example system #5: Fear learning and its neural circuits. (7/6/2018)
11.	Example system #6: Reward-based learning and its neural basis. (19/6/2018) *[NOTE: special date. Tuesday 9:15-12:00. Location: Candiotti auditorium]*
12.	Example system #7: Decision-making in the brain. (21/6/2018)
13.	Psychophysics: (i) Basic concepts, how to measure JND's, signal detection theory and ROC. (ii) Visual psychophysics. (*Guest lecture by: Prof. Dubi Sagi, Weizmann Institute*) [5/7/2018]

Formalities

- **Grading:** 100% - Final exam (*open material*). NO compulsory reading.

- **Bibliography:**

We will use three main textbooks in this course:

- *Behavioral Neurobiology, An integrative approach*, 2nd ed., Zupanc G. (Oxford, 2010)
- *Behavioral Neurobiology*, Carew J. (Sinauer, 2000)
- *Learning and Behavior*, Bouton M. (Sinauer, 2007)

Additional material for some of the lectures is covered in the following books:

- *Sensory Ecology*, Dusenbery D. (Freeman, 1992)
- *An Introduction to Behavioral Endocrinology*, 4th ed., Nelson R. (Sinauer, 2011)
- *Neuroeconomics: Decision making and the Brain*, 2nd ed., Glimcher P. and Fehr E. (Academic Press, 2013)